# A LOOK AT THE PROBLEMS OF PESTICIDE UNDERREPORTING AND UNDERRECOGNITION AS IT PERTAINS TO THE CALIFORNIA FIELDWORKER

For Dr. J. Lederberg, Instructor
Seth Foley, T.A.
Human Biology: Health as Human Ecology
Winter Quarter, 1977 Human Biology 102
March 22, 1977

by Jose Juan Vargas

# INTRODUCTION

The following reflections on the complex issues facing legislators, health officials, regulating bodies, and a concerned public are an answer to my own desire to learn more about one of many issues plaguing farmworkers in rural California.

In the summer of 1976 Professor Donald Kennedy suggested that I look into something called the "Tulare Study". My interest heightened when I learned that its rough and preliminary findings suggested that the actual incidence of pesticide related illness in agriculture may be over 30 to 50 times that actually reported to the State.

Certainly a lot was known already about the significance of this study but Don suggested I look at the issue of just how valid the Tulare Study's inferences might be. The Tulare Study was conducted by Henry Anderson, with the Department of Health in 1969. It utilized Household Interviews in order to ascertain the level of underreporting of pesticide related illnesses.

I soon became ecstatic because I remembered that before I come to this university, in the summer of 1973, I took a job as an "independent information gatherer", as we were called, and went from house to house conducting household interviews armed with health survey questionnaires as was done in the Tulare Study. In this case the study in which I interviewed fieldworkers was conducted by Richard Howitt of the University of California at Davis, School of Agricultural Economics Department. He was studying the economic problem of internalization practices and incorporated much of Anderson's approach as a medium with which to study internalization policy.

In order to feel that I could begin to understand and evaluate the Tulare Study, I've felt it important to review for my benefit some information about pesticide epidemiology as well as material on the meaning of "underreporting". In this way I could distinguish from this word the "under-recognition" that certainly goes on among my fellow farmworkers when they are unaware of the effects that sprays, dusts and treated foliage have on their respiratory, and central nervous systems and their exposed bodily surfaces.

Howitt basically re-affirmed Anderson's inferences about the gross under-recognition that occurs on a day-to-day basis and about the widespread lack of knowledge that workers have concerning basic rights (i.e. Workmens Comp and Disability Insurance). The issue of under-reporting will be looked at last in this report.

TABLE OF CONTENTS

Part I: Pesticides and Pest Control

1. The Hazard of Pesticides

2. Alternatives in Pest Control

Part II: I Heard it thru the Grapevine

Part III: Going Below the "Tip of the Iceberg"

Part IV: Community Studies on Pesticides -
The "Tulare Report"

1. Results

2. On Workmen's Compensation

Part V: The Monterey-Stanislaus County Study or
The "Howitt Report"

1. Results

2. SUMMARY

1. Pesticides and Pest Control

While some believe that any pesticide is safe regardless of the toxicity, concentration, or volume , others will state that millions of pounds of pesticides are applied annually in California so as to create an emotional fetter that only serves to cloud the real issues.

The agricultural scenario is immutably caught in a web of bitterness between labor and management that has not been without violence or mortality. Yet these human cost are not figured into Public Health equations or Worker Safety Manuals. But if field work is perilous, it is only now that certain sectors of our society are displaying the courage to employ the reason necessary to bring to the fields a level of occupational safety enjoyed by most industries today.

Pest control in California has been characterized by a state of perpetual motion. Pesticides are banned (i.e. DDT, 1973), by regulatory bodies, or their permitted uses are redefined.[1] Farmers may find that another toxicant works better, is cheaper or less hazardous. Atmospheric conditions exert their effects on the activity of pesticides. "In hot climate management and supervisory personnel must exercise additional care and caution, since intoxications are more likely to occur."[2] Wind and drought also complicate the enviromental picture since drift may contaminate nearby crops and property while drought tends to limit hydrolytic degradation of pesticides.

---

1. By the California Department of Food and Agriculture, under SB 1140 (Chapt. 1169, 1969) which requires it to reestrict or eliminate from use a pesticide which endangers the agricultural or non-agricultural environment.

2 Deichman, William, PhD. "Safe Handling and use of Organophosphate Pesticides", Pesticide Symposia. Seventh Congress. August, 1970. Pg 212.

THE HAZARD OF PESTICIDES

We do, however, need to evaluate the safety of an agricultural chemical. Three important questions that allow us to make sense of occupational morbidity date are:

1) How much pesticide is used?
2) What is its toxicity?
3) How is it applied?

To apply these question to understand why some chemical which have a higher toxicity to man are proving safer in the fields we can select two organo-phosphates: Thimet and parathion. Since chlorinated hydrocarbons have been gradually phased out (DDT), the use of organo-phosphate insecticides has been rising steadily.[3] Across various kinds of O-P toxicants their effect in depressing erythrocytic cholinesterase (ACHE) and plasma cholinesterase (PCHE) activity is fairly uniform. Clinically they manifest a spectrum of illness from latent, mild to moderate, and finally severe systemic dysfunction. They also will cause inflammation on the body surface or respiratory illness.

With this information let us look at the reported illnesses for 1975. Parathion-related illnesses accounted for 55 cases reported to the California Department of Health. Thimet was implicated in 23 cases. Toxicity data looks like this:

| | $LD_{50}$ for oral intake (mg/ml) Rats | | Reported illnesses due to Ag Chemicals, 1975 |
|---|---|---|---|
| | Males | Females | |
| Thimet | 2.3 | 1.1 | 23 |
| Parathion | 13 | 3.6 | 53 |

By asking how the chemicals are applied we learn much about the mechan-

3 Namba, Tatsuji, MD. "Organo-Phosphate Insecticide Poisoning" June 1973. Resident and Staff Physician. Pg. 31.

isms of exposure to organo-phosphates. Thimet comes in granules and is injected into the ground. This minimizes direct human contact. Parathion however, comes in liquid form (some in dust) and is applied topically to foliage where it may be absorbed directly to the body or dislodged as airborne dust capable of entering the respiratory system.

The danger posed by a pesticide may be heightened by either potentiation or degradation of a substance to a more harmful product. Potentiation causing dermatitis was confirmed in one chemical producing plant with NIOSH technical assistance to staff hygienists, safety engineers and doctors.[4] Degradation in weathered fields converts parathion to paraoxon[5] which has been reported to be 10 to 50 times more toxic than its parent compound. The same study (5) concluded that organo-phosphates are absorbed almost entirely through the dermal route.

ALTERNATIVES IN PEST CONTROL

Resistance to pesticides may develop rapidly. There is evidence of increasing insect resistance to methyl parathion.[6] DDT-resistance to mosquitos and houseflies are good examples. For these and other reasons (i. e. insect-predator decimation) an integrated approach to pest-management involving biological intervention, genetic tecniques, cultural practices, formulation and applicathon innovations or the use of natural pest predators is winning increased attention.

Integrated Pest Management (IPM) is not new to California. About twenty

4 Ahmad, Irshad, MD, Phd. "Chemical Potentiation and Dermatitis". Journal of Occupational Medicine. VOl. 18, No. 11/Nov 1976

5 Spears, Robert C., et. al.,"Pesticide residues and field workers". Environmental Science and Tech. Vol. 9, No. 4, April 1975 Pg. 308.

6 San Francisco Chronicle, "The Pesticide Proliferation". Writtwn by Dan Morgan and Peter Milius, January 16, 1977.

insects and weed pests have been controlled solely by biological means in California since 1923[7] and another thirty insects, mites, and weeds are presently the objects of further studies in biological control[7]. A good example of both the failure of chemicals alone and the success of IPM is in the control of two cotton pests, in the San Juuquin Valley, the Lygus and the Heliothis. The latter insect, normally controlled by a complex of natural enemies would proliferate when insecticides killed off its predators. Today largely due to research by van den Bosch, et. al. the decisions to use insecticides or late-season natural control is made by evaluating Heliothis populations and crop devlopment.

A government study chaired by Stanford's Donald Kennedy recommended that:

> We recommend that the agencies concerned with pest control problems recognize their dual responsibilities to the support of basic research on ecosystem dynamics and the biology of pest organisms, and to training of the pest management specialists who will be needed to guide growers in the application of the new knowledge.[8]

But funding for such research may be hampered in California ironically by the spreading belief that the "California Experience" is peculiar to this state alone. If this view affects federal funding decisions then further study of IPM as well as re-entry interval evaluation will be threatened.

The creation of alternative pest control strategies will undoubtedly require revamping of legal, regulatory and enfocement roles as well as a re-modeling of attitudes toward modern and more humane as well as more cost-effective (Lygus bug) pest cultural practices.

---

7 Graham, Frank Jr. Since Silent Spring. 1970. Pg. 221.

8 National Academy of Sciences, "Contemporary Pest Control Practices and Prospects: The Report of the Executive Committee", in Vol 1 of Pest Control: An Assessment of Present and Alternative Technologies. 1975 Pg. 22.

## 2. I Heard It through the Grapevine

Since 1959 agricultural employees have been entitled to workers compensation. For this and for public health concerns whenever a doctor attends an occupationally related illness, he must submit a report after the first examination. The report required under the California Labor Code (1967) is called the Doctor's First Report of Occupational Injury and is sent to the Department of Industrial Relations.

Based on these data the Epidemiologic Studies Program and the Occupational Health Section of the State Department of Health, compile statistics of occupational disease attributed to pesticides and other agricultural chemicals. A look at these statistics revealed that parathion was the most implicated in yearly episodes of multiple systemic illness (See Table I).

In 1970 four episodic outbreaks occurredyet nearly 1/3 of the patients treated were not reported as workmen's compensation cases. This had been a suspicious pattern since 1949 and I asked the Chief of the Epidemiological Studies Program, Dr Ephraim Kahn, what was the evidence that led him to confirm that underreporting by doctors was occurring. He said that a study conducted by the Department of Health in Tulare interviewing farmworkers and secondly the discrepancy between treated cases and reported cases whenever an outbreak was investigated.[1] He cited a recent mass-poisoning in Madera, on September 7-8 where over 100 workers were adversely exposed yet he has only seen 6 Doctor's Reports so far.

In order to use epidemiology to its fullest potential knowledge had to be gleaned about the sociology of the work environment. While there are Philpinos, Portugese and Black ethnic groups in the fields, those of Mexican de-

1 Kahn, Ephraim, MD. Personal Communication. March 15, 1977.

scent make up approximately 75% of the labor force in California. Communication gulfs exist between thinners, pickers, pruners and their foremen, labor contractors, and especially between their ~~labor contractors~~ employers. Thus one needs to listen to the grapevine communication system to understand not only the true magnitude of the problems, but what is being done about it, how it is perceived by workers and who is paying for the costs of illness and days lost from work.

Since 1969 there have been two studies to assess the points I mentioned above and these were conducted in order to assess the level of underreporting. However, I believe they were not studying underreporting per se but rather under-recognition and I shall address this point in the next part of this paper.

A third reason that led Dr. Kahn and others to doubt the efficiency of reporting with respect to fieldworkers was that no mild or moderate cases were generally reported. What he saw was generally of a severe and dramatic clinical picture; and these were discovered generally through investigating multiple systemic illnesses. He asked, "Why are there no reports from the rest of the spectrum?"[2]

[2] Kahn, Ephraim, MD.. "Pesticide Related Illness in California Farm Workers", Journal of Occupational Medicine. Vol. 18. No. 10, October 1976, P. 694.

## 3. Going Below the "Tip of the Iceberg"

> Nevertheless,, we have come to the conclusion that the handful of reported cases probably represents only the tip of the proverbial iceberg.
>
> Ephraim Kahn MD
> October, 1976

While reports come in praising California as the leader in regulation and surveillance, Robert L. Rudd of the University of California was quoted as saying, "I see only one major difficulty; the awareness of the true magnitude of the pesticide problem".1

"There may be a great deal of underreporting . . . . The injured employee may be fearful of losing his job if he reports it. If he is an unregistered alien, he may be afraid . . . . if he reports his illness. whether there is More, Moderate,or Slight underreporting, one can only conjecture."2

The above statement is from a California State Compensation Insurance Fund official actually arguing against an over-emphasis on pesticide poisonings in farmworkers.

All of the above statements have come in the wake of much concern over the validity and internal functioning of Workmen's Compensation,of medical treatment and reporting follow-up; and of fieldworker recognition patterns toward seeking treatment and compensation.

---

1 Graham, Frank, Jr, Since Silent Spring, 1970, pg. 220.
2 Whiting, William B., March 1975. "Occupational Illnesses and Injuries of California Agricultural Workers" Jour. Occ. Med. Vol. 17, No. 3. Pa. 181

Two working definitions are helpful at this point. Reporting shall refer to a function that occurs subsequent to an examination of an actual occupationally related work injury whether dignosed as such or not. Thus a misdiagnosis of a pesticide illness as a brain hemorrage[3] constitutes underreporting. Doctors may act idealistically and in the case of an illegal worker fail to provide reports in pesticide cases. The reasoning may be less lofty as in the case where sympathies lie with a grower who is the doctor's best friend.

Recognition is a word I shall use to refer to the function of both awareness of illness and the choice to seek treatment and compensation. For instance, an agricultural worker unfamiliar with pesticide etiology may not correlate his symptoms with the work site. This constitutes under-recognition. Also a worker knowing that the nearest clinic may be 40 miles away or that it has never been a welcoming place with its non-Spanish speaking staff, may choose instead for more personalized treatment through home remedies. That is under-utilization

An example of the absence of Recognition and Reporting where they should have an expected likelihood of occurring together is provided in the doctor's office. With questioning by a doctor to ascertain a work related injury the patient may not know if the fields were sprayed or if they were with which substances if more than one and its intensity. If the worker reports to a doctor, the doctor may choose not to recognize a pesticide illness and this choice could be facilitated by a patient-doctor relationship characterized by uneasiness where the patient is either on Medi-Cal, has no money, or is illegal. Dr. gets more money for fee-for-service than W.C. fee-schedule; also avoids red tape.

3 Pesticide Posoning may also mimic: heat stroke, heat exhaustion, hypoglycemia, gastroenteritis, pneumonia or other severe respiratory infections and asthma. From "Diagnosis and Treatment of Poisoning by Pesticides". US EPA, Office of Pesticide Programs, 1973.

Field recognition differs from medical reporting. Medical reporting requires medical diagnosis, but field recognition does not necessarily lead to reporting. Improving worker education and accessibility to Workmen's Compensation renumeration may be watered down by that portion to which Medical personnel are subject to err, commit wrongdoing or simply know nothing about the occupational work hazards in their region.

The two studies by Anderson (Tulare) and Howitt (Monterey and Stanislaus Counties) were in part assessing the levels of field recognition.

Medical reporting patterns could be studied by stationing an observer in a physician's office and monitoring his work-related behavior. How quickly such a study will secure the necessary go-ahead is an open question.

A third function that contributes to the unseen incidence of pesticide illness and the most insidious,yet perhaps, the most central to the problem involves the employer. His role should be that of preventing untoward exposure, yet, he is frequently responsible for mass incidents of pesticide exposure. A grim example of employer and doctor malfeasance comes recently from the state's worst mass-poisoning incident which occurred on September 7-8, 1976, in Madera, California. The incident triggered a State Senate Committee investigation headed by Senator Arlen Gregorio which convened November 16,17 and December 1 of that year. The farmer had bought atropine pills from a local doctor in order to treat victims should any workers become ill. Both,farmer and doctor, committed misdemeanors. Testimony about the incident which left over 100 adversely exposed to Torak (dialifor) revealed that:

> The workers were not advised of their workers comp rights. Only three went to CRLA wiht complaints. None, it seemed, were aware of the Division of Industrial Safety (DIS). The doctors who initially treated the victims allegedly did not fill out the Doctor's Reports that are required by law. The committee was also told that it takes a letter from a doctor to trigger an investigation of suspected posoning[4]

All were illegals

In summary underreporting is different from underrecognition and we shall now look at two California community studies that examined the issue of underrecognition.

4 Cal-OSHA Reporter, "Gregorio Pesticide Hearing, November 16", November 29, 1976

4. Community Studies on Pesticides - The "Tulare Report"

From January 1,1968,to December 15, 1969,the Department of Health conducted a community study of fieldworkers to clarify the issue of suspected underreporting of pesticide poisonings in California agriculture. They contracted the Community Studies on Pesticides program which submitted a tentative report, not meant to be final but meant to indicate the trends that were found to be true. It should further be mentioned that the report was released, that it triggered, so far as I've determined quite a storm, and that subsequently the funds of the study ran out and to date has not been completed.[1]

Quoting from the tentative report, the questions it addressed were the following:

> What are the facts? Do workmen's compensation figures grossly understate the true incidence of pesticide poisoning? . . . if so by how much? . . . Do farmworkers not go to doctors? . . . Do they go to doctors but pay for it from some source other than the workmen's compensation insurance system? . . .[2,3]

It attempted to answer these questions and others (omitted here) by conducting a "blind" household survey of 1120 non-migrant field laborers. A control group of 102 individuals of like economic, social and ethnic background was also studied. Interviewing was conducted by specially trained, though non-professional natives of Tulare County. The interviewers reflected the heterogenous mix of the study population.

---

[1]The "Tulare Report" contains a disclaimer which disallows reprinting of its parts; thus, this paper may not be xeroxed without my obtaining permission first.
[2]California Community Studies on Pesticides: Morbidity and Mortality of Poisonings, report to Office of Pesticides, Bureau of State Services (EH), USPHS, January 15, 1970. p. 100.
[3]Hereafter, I will cite Henry Anderson as the author of the "Tulare Report". He was primarily responsible for the design and execution of the study.

To ascertain the true incidence of pesticide poisonings a list of the most common symptoms of pesticide poisoning was utilized to elicit morbidity information. This procedure is commonly used and accepted by the U.S. Public Health Service in its studies.

Now most sociologists or epidemiologists will say that to ascertain incidence of a disease one should draw randomly from the population at risk. However in this case a "saturation method" [2](p.103) was used where the interviewers went to known farmworker neighborhoods and knocked on all doors and interviewed all farmworker households located. I believe this modified cluster sampling method was valid since no other occupations were desired and since it relied on the special knowledge of the interviewers to locate those neighborhoods where field workers might live. Inferences would be made as a per cent of total field workers sampled; and this data could validly be extrapolated to the field worker population of Tulare County. Thus I believe that sampling which is a key determinant in the success of a study was conducted adequately.

A second key ingredient to a household survey is the questionaire. I have examined it and have remembered that some individuals (in the field of public health) have privately mentioned that its format was sketchy. This fact, they contended, would allow the interviewer to "ad lib" and thereby bias the response.

1) Based on my experience with a similar 1973 questionaire I frequently had to carefully re-word, and re-translate technical questions. Because the major dilemma common to all questionaires is that they are written in the language and method of thinking of the authors, when author and audience differ in culture, language and social background, the interviewer bears the indispensible charge of

interpreting and focusing the questions . Moreover I had to restate the Spanish often times differently from respondent to respondent as I judged that I would certainly bias the data if the respondent never understood the question. Thus "ad libbing" is not only necessary but helps clarify questions. Ultimately any study is only as good as its interviewers.

2) If the interviewers provided reinforcement inadvertently through clarification attempts this could serve only to increase accuracy and reduce the bias of chronic condition reporting . . . .[4]

The key variable that exonerates the questionaire is the fact that the interviewers were unaware that they were conducting a study about pesticides.

Invariably with a study of this nature, it is difficult to remove all potential bias. There are regrettable questions. Towards the end of the interview responsdents were asked if they had heard of four major pesticides. Two reasons warn against hasty judgement with regard to these questions:

1) The above questions appeared after those that addressed the issues of primary interest in the study (i.e. symptom reporting, knowledge and utilization of workmen's compensation and/or disability insurance), therefore, they could not have biased the respondent during the earlier questioning significantly.

2) I believe that even if the questions were first on the list they would have had no lasting affect. Here's why. Given that the results will show that farmworkers did not know the meaning of these chemicals just as they did not in an "overwhelming majority of the cases" know they had worker's compensation then there was no initial idea or belief to bias! On the other hand had they initial knowledge then it can be seen that the questions could bias the respondent.

Also such terms as "pesticides" or "poison"were not used at all in the questionaire.

The foregoing remarks address those points that might be considered "weaknesses". In conclusion I do not believe that they jepardize the study's

4 US DHEW, Public Health Service, "Reporting Health Events in Households Interviews". Series 2, No. 45, March 1972, Pg. 4.

validity. They do serve to underscore the difficulty that was faced in designing the first study of its kind which asked the right questions, of the right people, with sensitivity and a sense of scholarship.

The preceding arguments dealt with the possiblity of over-reporting by respondents. There are also reasons to believe that the results err in the direction of conservatism. In Anderson's words:

> A team of professional survey interviewers, imported from San Francisco or Los Angeles, would have had difficulty obtaining any results, and the results it did obtain would have been of questionable validity. Most farm laborers are suspicious of government workers, and to the extent they would have cooperated at all they would have given answers which calculated were most likely to keep them out of trouble. (p. 102)
>
> To be sure there are problems or recall in any health survey. (note: the study asked for symptom reporting within the last 12 months) An informant says, in perfectly good faith, that an incident happened with the past year when in fact it took place fourteen or fifteen months ago. But it is most doubtful that this source or error results in any net overreporting . . . . All methodological studies of the health survey technique indicate that such errors are more than balanced by failure to remember and failure to report incidents . . . . (p. 104)

RESULTS

Now let us discuss the results of the Tulare Report.

Farmworkers were questioned as to the occurence of a list of specific symptoms that originated from the work site and of sufficient severity as to require medical attention. not necessarily.

In order for the symptoms to be catalogued as probably due to pesticides six or more symptoms had to be present. The farmworker group reported this severity (termed systemic - sx) 169 times out of 1120. The control group did so only one time out of 102 times. The control manifested this

condition 1/15 as often as did farmworkers. This is clear evidence that something in the agricultural enviroment (i.e. pesticides, dust, or heat) is causing this difference in reporting.

When converted into rates these figures become startling especially when compared with the reported figures from Doctor's Reports. The following table illustrates the findings.

| | No.[5] | | Rate/1,000 | |
|---|---|---|---|---|
| | Farmworkers | Controls | Farmworkers | Controls |
| Total | 1,120 | 102 | | |
| Medical Rx for Specified SX | 279 | 2 | 249 | 20 |
| Medical Rx for Systemic SX | 169 | 1 | 150 | 10 |
| Tulare Country Reported Rate of Pesticide-Related Occupational Illness --Among Hired Farmworkers | | | 2.0 | |

Had I made the conclusions from the data, I would have corrected the rate (150/1000) for the possibility of "background" illnesses within the workplace but not attributed to pesticides (dust, heat exposure, spores, plant reactions, etc.).

The corrected figure using even a high confidence limit would still, however, fall significantly greater than the actual incidence rate per thousand per year (2/1000) reported by Tulare County. Thus instead of an actual incidence 75 times the reported figues I have decided that if 1/2 of the respondent-reported illnesses were considered non-pesticide related we would still see nearly 30 to 50 times the reported rate (thru Doctor's Reports).

5 Kahn, Ephraim. op. cit.(Pg. 695)

ON WORKMEN'S COMPENSATION (W-C)

I made the distinction between underreporting and underrecognition so that I could talk about the Tulare Study appropriately. We recognize that this study could not have actually studied the former because it did not look at the behavior of doctors but rather the behavior of farmworkers. And after all from this perspective, at least, can't we say that if farmworkers are getting sick (more often than State statistics show) and if they aren't going to doctor's then presumably they don't RECOGNIZE they are sick? Or they do not RECOGNIZE that they have social rights (i.e. W-C) that they may partake of.

On this matter the study reported that an "...overwhelming majority (of farmworkers) have no operational grasp of the program..."

But to say that this is a lack of recognition is to one-sidely examine the causes for this state of affairs (as if the ignorance were an innate feature of field labor.) On the basis of the study's interpretation of the underrecognition but largely on my own appraisal here are some contributing factors to underrecognition:

a) Communication gulfs. In field labor, even in a conglomerate or large company there will be no company doctor, to be available for emergencies and to draw blood for baseline ChE analysis. Translations of the W-C law may not be posted in the work place or in a barracks.

b) Education. Workers may be illiterate.

c) Government Distrust. Since society as a whole may appear to be hostile, workers may have developed a hostility and skepticism toward management and employer, and these individuals react by not attempting to communicate information important to the worker.

d) Immigration Status. If the worker is an illegal alien he most certainly will guard his identity and not seek out sources of treatment or W-C which might in the end see him deported.

e) Seasonal nature of the job. If the worker has a limited time of peak season where he earns his livelihood for himself and his family back in Mexico he may think twice about taking a valuable day off and lose a day's pay or even lose his job.

f) Failure of Workmen's Compensation program. During the years of the study since the program was extended to field laborers a worker had to be out of work due to illness for more than 7 days. The acute effects of O-P poisoning would be gone by then. (In 1973 this was changed to 3 days).
An adequate job of informing the workers is not being done much of this is tied to the communication gulf, language and cultural barriers, but these are no excuse when it is the State's function to inform all workers of their rights under W-C.

g) Failure of Management. There is a general sense of paternalism in labor relations. A foreman or employer refers to a crew of workers as, "my crew". At the extreme end of this condescension there is a disregard, and this is not conducive to a sharing of information about labor rights.

h) Failure of the pesticide Safety Regulations. The Anderson Study sagaciously threw light on the inefficiencies of this sector. A later study would show that lack of reading comprehension correlated significantly with inability to comprehend a poison (skull and crossbones) label. Thus without these comprehensions the worker is at a distinct disadvantage in associating an illness due to spilling a chemical, spraying "restricted" chemicals or otherwise contacting pesticides.

i) Geographic distances

The list serves to illustrate that the "Pesticide Problem" we started with has assumed social and economic overtones which would by no means be solved if the reporting function (Doctor's Reports) were made responsive to the law. A question naturally arises from these considerations, which was first asked by Anderson in his study. If there is an unmeasured degree of illness and W-C is not paying for it, WHO IS?

Although Anderson noted social welfare arrangements (particularly the Medi-Cal program) and increased out-of-pocket costs were covering the costs of work illness it fell upon another study to clarify the economic implications of this problem.

5. The Monterey-Stanislaus Counties Study or the "Howitt Report"

During the peak seasons in 1973, an agricultural economist, Richard C. Howitt set out to ask many of the same questions that Henry Anderson had asked. He was interested in internalization policy and how it affected agriculture. His findings were reported in a different manner, for different reasons yet they vindicated the Tulare Report since it confirmed the notions expressed by Anderson about underrecognition.

I shall not go into detail, since I am not qualified to understand the economic theory behind Howitt's full thesis. But for the purpose of this paper I must mention only his reasoning pertinent to underrecognition.

Howitt has stated that there is a fundamental problem with all systems of reporting illnesses in rates per 1000 per year since they do not reflect the true costs to the worker. W-C data fails to account for much illness due to ommission of illnesses in fieldworker populations because of the 3-day requirement for being ill.

I should mention that in Howitt's schedule, any of the points of prior academic controversy were revised. Howitt's list of symptoms was identical to Anderson's except for the addition of one more symptom: saliva. Questions were well masked for both interviewer and respondent. He asked questions to ascertain the workers comprehension of W-C and Unemployment Disability Insurance.

A new and important question Dr. Howitt added was one designed to ascertain the worker's comprehension of a pesticide label and picture (of a skull and crossbones; category 1 pesticide).[1]

Respondents were asked to recall any of the symptoms only if they occured within the preceding 30 days which improved recall reliability. He sampled two counties with more than twice the general population and fieldworker population. His study sampled migrant as well as non-migrant fieldworkers.

1 As an interviewer, in this study, the last question we would ask as we displayed a card with poison symbol was, "When you look at this label what does it mean to you?"

RESULTS [2,3]

Howitt tabulates only those symptoms only of sufficent severity to have caused a loss of more than ½ days work. Then he employed a confidence rating such that only 1.6% of those reporting symptoms were categorized as "Definetely Pesticide Related". 6.4% of those reporting were termed "Probably Pesticide Related. Furthermore to be rated in the 1.6% level (level 1) the case must have been so considered and diagnosed as such by the physician, or in certain cases by the foreman.[2]

By examining the following table[4] one can see that there is a 300 fold difference between the rate in level 1 and the reported rate. You will notice that he is not obtaining his hours lost from the Workmen's Compensation records.

On the issue of worker comprehension of W-C he found that 70% of the workers had not heard of Workmen's Compensation Insurance. Howitt recommended that,"some sort of greatly expanded outreach program explaining the rights and benefits to farm workers will be needed."[4](Pg 9).

He also showed that when testing label comprehension 20% had no comprehension of the printed label or the picture. Thus each of these functions (medical reporting, W-C utilization and regulatory practices) which can function to internalize costs was inadequate and hence the worker was encumbering the costs for illness and lost work days.

SUMMARY

The circle is complete. I have tried to show that many human costs are not accounted for by present social, State systems. We have seen the clues that led epidemeological experts to suspect underreporting. We have seen two studies indirectly confirm this by directly assesing the degree of information available in the fieldworker's physical, environmental and beureacratic environment.

---

2 Kahn, Ephraim, MD. (op. cit).

3 Howitt, Richard E, PhD, Pesticide Externality Policy, an Optimal Control Approach, Doctoral Dissertation, University of CA, Daivs, 1975

4 Howitt, RE, and Moore CV, "Internalizing Health Effects of Pesticides" Presented at American Agricultural Economics Association Meeting, Columbus, Ohio, August 1975

For me it has been a closing of a personal circle. After I worked on the interviewing I spent several years wondering whatever became of that "health survey" I worked on. Now I know.

And while sitting in the State Senate, I recalled how my fellow farmworkers in the fields really did not know what Workmen's Compensation was. That's why the comment from Assemblyman ~~Strong~~ John Thurmond is frightening with its political implications. He said, shortly after Dr. Howitt testified, "I can't believe that 70% don't know what W-C is. Why I am real close to my constituency, and these people are very intelligient, some more intelligent than many metropolitan folks. Why they know every single law that pertains to them."

And if I were to have walked up to him and advised him that it isn't a question of intelligienc but of EDUCATION I doubt he'd disbelieve me, but as a farmer himself he would strengthen his attempts to undermine the rights of farmworkers.

Fortunately the hearings were in better hands, and we may all await patiently as the State Legislator begins in the weeks and months ahead to face these issues head on as they attempt to pass another bill, but this one will adresse itself to some of the issues I've reviewed here.

— Synopsis of Hours Lost/1000 Hours Worked.[6]

| Attributed to Pesticides | | | | | All Causes | |
|---|---|---|---|---|---|---|
| Extrapolated from Monterey/Stanislaus Field Worker Survey — 1973 | | | Statewide Average from Physician's First Reports — 1972/73 | | Dept. of Industrial Health Survey — 1973 | |
| Confidence Levels* | | | Farm Workers | PCO.† Workers | Highest (Constr.) | Average (mfg.) |
| 1 | 2 | 3 | | | | |
| 1.467 | 2.653 | 5.251 | .0056 | .6973 | 4.740 | 3.004 |

*Level 1 Definitely pesticide related
Level 2 Probably pesticide related
Level 3 Possibly pesticide related
†PCO denotes workers for Pest Control Operators

THE END

TWO COMMUNITY HEALTH SURVEYS

Characteristics of the Community Studies

| COMMUNITY | Tulare | Monterey | Stanislaus |
|---|---|---|---|
| Pop size | 188,322 | 250,071 (494,577) | 194,506 |
| Character | rural some urban | rural, some urban | |
| Medical care facilities | 1 General Hospital<br>6 other hospitals<br>9 Co. Clinics HEW<br>Salud Health Clinic | 1 General Hospital<br>6 other hospitals<br>Numerous Co. Clinics | 1 General Hospital<br>10 other hospitals<br>other information unavailable |
| Study instruments | Household Questionaire<br>Doctor's First Reports*<br>Double-blind | Household Questionaire<br>Doctor's First Reports<br>Double-blind | |
| Study Period | Jan. 1968--Sept. 1969 | Summer 1973 | |
| Recall Required | 12 months | 30 Days | |
| Study Methods | | | |
| Controls: | Non-agricultural workers. Matched Variables: Area (same), time period, age, sex, ethnicity | | |
| Respondents: | Fieldworkers** ( Non-migrant ) in fieldworker neighborhoods. ("Saturation Method") | Fieldworkers from home neighborhoods and Labor Camps. (Random cluster sampling). Migrant and Non-migrant | |
| Interviewers: | a) Trained, drawn from labor force; hence, non-professional, local individuals<br>b) Questionaires reviewed<br>c) Bi-lingual | a) Trained, drawn from labor force; hence, non-professional, locals individuals<br>b) Bi-lingual | |
| No. Interviews | 1,120 | 1,477 | |

* Doctor's First Report of Work Injuries (DRFWI)

** Excludes Foremen, supervisors, employers.

Table I

INCIDENCE OF MULTIPLE SYSTEMATIC ILLNESS FROM EXPOSURE TO OP-PESTICIDES FOR AGRICULTURAL WORKERS IN CALIFORNIA, 1949-1974

| Date | Location | No. ill | probable no. exposed | Crop & activity[a] | Pesticide implicated | AIA[b] | Entry time[c] | Previous applications: Spray used | Previous applications: Interval[d] |
|---|---|---|---|---|---|---|---|---|---|
| /3/49 | Marysville | 20-25 | 56 | Pears | Parathion | 2.50 | 12 | -- | -- |
| /27/51 | Delano | 16 | 24 | Grapes | Parathion | 1.87 | 33 | -- | -- |
| /27/52 | Riverside | 11 | 30 | Oranges | Parathion | 2.00 | 16 | -- | 19 |
| /6/53 | Riverside | 7 | -- | Oranges | Parathion | -- | 17 | -- | -- |
| / /53 | Riverside | -- | -- | Citrus | Parathion | -- | 34 | -- | -- |
| / /53 | Bryn Mawr | -- | -- | Citrus | Parathion | -- | 33 | -- | -- |
| / /59 | Whole State | 275 | -- | Citrus | Parathion | -- | -- | -- | -- |
| 0/5/61 | Terra Bella | 10 | -- | Lemons | Parathion | 3.00 | 17 | Parathion | 97 |
| /9/63 | Hughson | 94 | -- | Peaches | Parathion | 2.00 | 14-38 | Parathion | 36-110 |
| /29/66 | Terra Bella | 9 | 15 | Oranges | Parathion | 1.87 | 15 | -- | -- |
| /8/66 | Porterville | 6 | 11 | Oranges | Parathion | 1.33 | 32 | -- | -- |
| /21/66 | Lindsay | 3 | 30 | Oranges | Parathion | 2.00 | 13 | -- | -- |
| 3/2/66 | Navelencia | 11 | 22 | Oranges | Parathion-malathion | 13.5p | 28 | -- | -- |
| 3/11/66 | Terra Bella | 9 | 28 | Oranges | Parathion-ethion | 3.75p | 46 | -- | -- |
| 9/2-23/67 | Hughson | 24 | -- | Peaches | Azinphosmethyl ethion | 1.5a 2.0e | 38-47 | Dicoful TEPP | 38-47 15-30 |
| 9/14-16/67 | Ballico | 3 | -- | Peaches | Azinphosmethyl | 1.5 | 66 | Dicoful | 38 |
| 5/5/70 | Porterville | 3 | 30 | Lemons (prunes) | Dioxathion | 6d 1n | 1 | -- | -- |
| 5/25/70 | Lindsay | 2 | 22 | Oranges | Parathion-ethion | 7.5p 6.75e | 14 | Parathion | 17 |
| 5/27-28/70 | Terra Bella | 8-11 | -- | Oranges | Azinphosmethyl ethion | 12a 4e | 8 11 | Azinphosmethyl | 10-12 |
| 9/14-17/70 | McFarland | 35 | 35 | Oranges | Parathion | 9.00 | 34-37 | Dioxathion | 120 |
| 10/1/70 | Orosi | 11 | 55 | Oranges | Parathion-malathion | 3p | 31 | Azinphosmethyl | 180 |
| 8/16-24/71 | Orange Cove | 8 | 9 | Olives (prune) | Parathion | 6.00 | 31 | -- | -- |
| 5/6/72 | Lindcove | 3 | -- | Oranges | Parathion | 2.5 | 21 | -- | -- |
| 9/15/72 | Exeter | 9 | 22 | Oranges | Parathion | 5.00 | 12 | -- | -- |
| 9/9/72 | Huron | 4 | 31 | Lettuce (weed) | Parathion | 2.50 | 1 | Parathion | 4-25 |
| 8/30/73 | Fowler | 27 | 32 | Grapes | (Dialifor) | -- | 41 | -- | -- |

[a]Unless otherwise indicated in "Crop" column, workers are engaged in picking operation. [b]Active ingredient per acre expressed in lb. [c]Days postapplication. [d]Days prior to most recent application.

Table 1 IE

REPORTS OF OCCUPATIONAL DISEASE ATTRIBUTED TO
PESTICIDES AND OTHER AGRICULTURAL CHEMICALS
CALIFORNIA, 1954-1973

| YEAR | ALL INDUSTRIES | AGRICULTURE | OTHER |
|---|---|---|---|
| | EXCLUDING EYE CONDITIONS AND CHEMICAL BURNS | | |
| 1954 | 391 | 248 | 143 |
| 1955 | 531 | 326 | 205 |
| 1956 | 789 | 464 | 325 |
| 1957 | 749 | 434 | 315 |
| 1958 | 910 | 599 | 311 |
| 1959 | 1,093 | 782 | 311 |
| 1960 | 975 | 668 | 307 |
| 1961 | 911 | 578 | 333 |
| 1962 | 827 | 545 | 282 |
| 1963 | 1,013 | 746 | 267 |
| 1964 | 844 | 539 | 305 |
| 1965 | 779 | 520 | 259 |
| 1966 | 869 | 565 | 304 |
| 1967 | 921 | 571 | 350 |
| 1968 | 834 | 499 | 335 |
| 1969 | 727 | 454 | 273 |
| 1970 | 957 | 634 | 323 |
| 1971 | 922 | 611 | 311 |
| 1972 | 921 | 597 | 324 |
| 1973 | 926 | 578 | 348 |
| | INCLUDING EYE CONDITIONS AND CHEMICAL BURNS | | |
| 1964 | 1,328 | 821 | 507 |
| 1965 | 1,340 | 836 | 504 |
| 1966 | 1,347 | 820 | 527 |
| 1967 | 1,400 | 838 | 562 |
| 1968 | na | na | na |
| 1969 | na | na | na |
| 1970 | 1,493 | 938 | 555 |
| 1971 | 1,447 | 919 | 528 |
| 1972 | 1,505 | 933 | 572 |
| 1973 | 1,451 | 887 | 564 |
| 1974 | — | 1157 | — |
| 1975 | — | 1343 | — |

REFERENCES


Ahmad, I., MD, PhD, MPH. "Chemical Potentiation and Dermatitis." Journal of Occupational Medicine, November 1976, vol. 18:11.

California Community Studies on Pesticides: Morbidity and Mortality of Poisonings, Report to Office of Pesticides, Bureau of State Services (EH), USPHS, January 15, 1970.

California Farm Labor Report, "Employment by County". For Period ending November 3, 1973.

California Department of Food and Agriculture, "Pesticide Use Report." 1976. Published 1977.

California Department of Food and Agriculture, Agricultural Chemicals and Feed. "Occupational Illnesses Due To Exposure of Persons to Pesticides in California." May 10, 1976

California Department of Health, Epidemiological Studies Laboratory, "Guidelines for Physicians." 1974.

California Depa rtment of Health, "Illnesses of Employed Persons Reported By Physicians to the State as due to Exposure to Pesticides on their Residues in California in the Years 1973, 1974, and 1975, According to Job and Type of Illness." November 1, 1976.

California Department of Health,"Pesticides Reported by Physicians in Ca;-ifornia as Causes of Illnesses in Employed Persons in 1975." August 20, 1976.

California Department of Health, Occupatinnal Health Section and Center for Health Statistics, "Occuaptional Disease in California Attributed to Pesticides and other Agricultural Chemicals, 1971-1973." 1974.

California Department of Human Resources and Development. "Farm Labor Report, Employment by County." No. 881-A. Period ending November 3, 1973.

California Department of Human Resources Department, "California Emplyment and Payrolls in Agricultural Labor, 1969" Report No. 129 No. 7 b, April-June. Also: Report No. 129, No. 7 d, Oct-Dec.

"California Senate Committee on Health and Welfare, Hearing on Occupational Illnesses Relating to Farmworkers, Pesticide Poisoning." California State Senate, December 1, 1976. Statement of Vernon E. Burton,

Chamberlin, R.W., MD., Radebaugh, J.F., MD., New England Journal of Medicine. "Delivery of Primary Health Care - Union Style." vol.294:12. Mar 18, 1976

Deichmann, William B., Ph.D., Pesticides Symposia (Miami, Halos and Associates, Inc., 1970) .

Freidman, Gary D., Primer of Epidemiology. (New York, McGraw-Hill Book Company, 1974). Chapter 6.

Gibson, Martha, and Watson, Ann, "Pesticide Exposure and Protection of California Farm Workers". Stanford University, November 1970.

Graham, Frank, Jr. Since Silent Spring. (Houghton Mifflin Company, Greenwich, Connecticut, November 1970). Chapter 20.

Howitt R.E., and Moore, C.V. "Internalizing Health Effects of Pesticides", Presented at American Agricultural Economics Association Meeting. Columbus, Ohio, August 1975.

Howitt, R.E. Pesticide Externality Policy, an Optimal Control Approach. Doctoral Dissertation, University of Calfiornia at Davis. 1975.

Howitt, R.E. "Testimony Notes". Presented at California State Senate Committee on Health and Welfare, Pesticide Hearings. November 16, 1976.

Kahn, Ephraim, "Pesticide Related Illness in California Farm Workers". Journal of Occupational Medicine. vol. 18:10. October 1976.

Kahn, Ephraim, "Recommendations Concerning DOH Role in Control and Regulation of Pesticides". California State Senate Committee on Health and Welfare, Pesticide Hearings, November 16, 1976.

Kessler, Irving I. The Community as as Epidemiologic Laboratory. (Johns Hopkins Press, Baltimore, 1970). Chapter 1.

London, Joan, and Anderson, Henry, So Shall Ye Reap. (New York, Thomas Y. Crowell Company, 1971). Chapter 7.

Lowrance, William F. Of Acceptable Risk, (Los Altos, California, William Kaufmann, Inc.,1976).

Namba, Tatsuji, MD, Ph.D.. "Organophosphate Insecticide Poisoning". Resident and Staff Physician. June 1973, pps.31-38.

National Academy of Sciences, The Report of the Executive Committee, Volume I, "Contemporary Pest Control Practices and Prospects: The Report of the Executive Committee", in Pest Control: An Assesment of Present and Alternative Technologies. (Washington, Printing and Publishing Office, National Academy of Sciences, 1975).

San Francisco Chronicle-Examiner. "The Pesticide Proliferation". January 1, 1977. By Dan Morgan and Peter Milius.

Spear, Robert C., et. al. "Collecting Foliar Pesticide Residues Related to Potential Airborne Exposure of Workers." Environmental Science and Technology. June 1975. vol. 9:6.

Spear, Robert C., Jenkins, David L., Milby, Thomas H. "Pesticide residues and field workers". Environmental Science and Technology. April 1976. vol. 9:4.

Spear, Robert C. "Technical Issues Surrounding the "Re-entry Problem". California State Senate, Health and Welfare Committee. Testimony to the Committee's Pesticide Hearing, November 16, 1976.

Stanford University, Family, Community and Preventitive Medicine Department, "Five Points Area Case Study." (A Fesno County Town Case Study).

University of California at Davis, Food Protection and Toxicology Center. "Summary Report, 1975".

University of California, Division of Agricultural Sciences, "Pesticide Information and Safety Manual". Fifth Printing, 1976.

United States Envirnomental Protection Agency, Office of Pesticide Programs, "Diagnosis & Treatment of Poisonings by Pesticides". No date, after 1971.

United States Deapartment of Education and Welfare, Public Health Service, "Reporting Health Events in Household Interviews: Effects of Re-inforcement, Questinn Length, and Reinterviews. Series 2:45. March 1972.

Viveros, Arcadio, "Statement to the Senate Committee on Health and Welfare to Consider Pesticide Poisoning of Farmworkers". november 16, 1976.

van den Bosch, Robert. "California Senate Committee on Health and Welfare Hearing on Occupational Illnesses Relating to Farmworkers Pesticide Poisoning. Testimony to the California State Senate Committee on Health and Welfare. November 16, 1976.